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First Mover Advantages in Financial Service Innovations

Luis E. Lopez [1]
Edward B. Roberts [2]

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[1] INCAE
[2] MIT Sloan School of Management

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Sloan School of Management
Massachusetts Institute of Technology
38 Memorial Drive, E56-390
Cambridge, MA 02139-4307

Abstract

A well-established stream of research indicates that innovative firms must carefully time their entry into new markets, and that there are advantages to early market entry. Such empirical regularity has not been extensively tested in financial services, despite the importance that the timing order of market entry might have for financial innovations. Such importance derives from the weak appropriability regimes faced by financial service innovators. This characteristic leaves innovators with pioneering as an important approach toward appropriation. Analyzing three lines of financial products (credit cards, debit cards, and pension funds), we find important market share advantages to early entry in financial services innovations. These results are in line with other research performed in other industries, particularly consumer products. We find, however, that using a traditional model of order of market entry doesn't convey all the information that is revealed through a detailed qualitative analysis of longitudinal data. Moreover, traditional models of order of market entry do not distinguish simultaneous entries from entries separated by long periods of time. A model using elapsed time since first entry seems more appropriate and renders stronger results and better interpretations.

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Please direct questions or comments to
Luis E. Lopez
Apartado 960-4050
Alajuela, Costa Rica

e-mail: lopezl@mail.incae.ac.cr

In this essay we try to answer one research question: Are there pioneering advantages in financial services? To answer this question we examine the relationship between order of market entry and long term market share for a set of financial products. Accordingly, the first part of the paper provides a review of the literature on pioneering. In the second part we formulate hypotheses and provide a research design for testing them. This is followed by data analysis and conclusions. Our findings indicate a negative relationship between order of market entry and market share. Using elapsed time since first entry as an independent variable permits qualifying in more detail such relationship.

Introduction and Review of the Literature

The empirical relationship between order of market entry and long term market share for new products is well-established. Kalyanaram and Urban (1992) analyzed 18 brand entrants in 8 different product categories of consumer packaged goods and found that later entrants into new markets suffer long-term market share disadvantages. For instance, as shown in Table 1, in the presence of 7 brands in the market, the pioneer captures 2.5 times as much share as the seventh entrant. These authors try to establish whether such advantages occur only through advantages in production costs, advertising, price, quality, distribution, and breadth of the product line, only to find after correcting for the effects of those variables, that such influences are not important, and to discover an apparently inherent penalty for late entry.

Table 1. Order of entry vs. market share (Taken from Kalyanaram and Urban, 1992).

# of brands in market	Asymptotic market shares for each order of entry						
	1st	2nd	3rd	4th	5th	6th	7th
1	100						
2	57	43					
3	42	32	26				
4	34	26	22	18			
5	29	22	18	16	15		
6	25	19	16	15	13	12	
7	23	17	15	13	12	11	9

Associated empirical findings, primarily in the marketing literature, report a negative relationship between order of market entry and market share. Robinson and Fornell (1985) analyzed 371 mature consumer goods businesses and found first-movers to have higher market shares than later entrants. On average, first-movers had a market share of 20%, early followers' market shares were 17%, and late entrants held 13% of the market. Similarly, Robinson (1988) studied 1209 mature industrial goods businesses and found pioneers to have higher market shares than later entrants. They had, on average, a market share of 29% versus 15% for later entrants. First-movers also tended to have higher product quality, more comprehensive product lines, and served ampler markets. Along similar lines, other studies have focused on cigarettes (Whitten, 1979), start-up and adolescent businesses (Lambkin, 1988), prescription drugs (Bond and Lean, 1977), and new corporate ventures (Miller et al., 1989). Lambkin (1988) analyzed 2 subsamples of 129 start-up businesses (using data for their first four years of operation) and 187 adolescent businesses (data for their second four years of operation) and found that, generally speaking, pioneers attained an important market share advantage over later entrants (about 24 % on average for pioneers vs. 9.7% for late entrants in the start-up subsample, and approximately 33 % vs. 13% in the adolescent subsample).

Table 2. A summary of some selected empirical studies on pioneering advantages

Study, year	Characteristics of the study and findings
Bond and Lean, 1977	Reviewed 11 new products in two prescription drug markets. Found that first entrants maintained market share leadership after more than 10 years in market. Later entrants needed to offer substantial additional benefits to surpass the first-mover
Whitten, 1979	Studied 7 cigarette markets and found that pioneering brands held over 50% of the market several years after their introduction. These cigarette brands were also those which were actively promoted and widely distributed
Robinson and Fornell, 1985	Analyzed 371 mature consumer goods businesses. On average, first-movers had a market share of 20%, early followers had a market share of 17%, and late entrants held 13% of the market
Urban et al., 1986	Analyzed 129 entries across 34 product categories. Important penalties were reported for late entrants (see Table 1) controlling for product positioning and marketing activity
Robinson, 1988	Analyzed 1209 mature industrial goods manufacturing businesses. The market pioneer holds 29% of the market on average. Early followers and late entrants retain 21% and 15% of the market respectively
Lambkin, 1988.	Considered 2 subsamples of 129 start-up businesses (data for their first four years of operation) and 187 adolescent businesses (data for their second four years of operation). Pioneers attained an important market share advantage over later entrants (23.96% for pioneers vs. 9.7% for late entrants in start-up subsample and 32.56% vs. 12.95% in the adolescent subsample).
Lilien and Yoon, 1990.	The likelihood of success for first and second entrants was lower than the likelihood of success for the third and fourth entrants in a sample of 112 new industrial products from 52 French firms.
Golder and Tellis, 1993.	Using an historical approach found that not all pioneering efforts ended in success. They report a 47% failure rate for pioneers.
Brown and Lattin, 1994	Modeled the effect of time in market on pioneering advantage. Found that time-in-market may exert a beneficial effect upon the pioneer
Huff and Robinson, 1994	Re-analyzed Urban et al.'s (1994) data on 95 surviving brands in 34 product categories. Found that longer lead-time increases the pioneer's market share reward

appear to be quite consistent across many product lines, as can be seen in Table 2. Kalyanaram, Robinson, and Urban (1995) summarized some generalizations that applied to prescription anti-ulcer drugs and consumer packaged goods. These generalizations are reproduced in Table 3.

Table 3. Order of market entry and market share for consumer packaged goods and prescription anti-ulcer drugs.

	Forecasted Market Share Relative to the Pioneering Brand		
	Consumer Packaged Goods		Prescription Anti-Ulcer Drugs
Entry order	Urban et al. (1986)	Kalyanaram and Urban (1992)	Berndt et al.(1994)
First	1.00	1.00	1.00
Second	0.71	0.76	0.70
Third	0.58	0.64	0.57
Fourth	0.51	0.57	0.49
Fifth	0.45	0.53	0.44
Sixth	0.41	0.49	0.40

Taken from: Kalyanaram et al., 1995.

Little work has dealt with services. Tufano (1989) found, for a sample of 58 financial innovations, the existence of some first-mover advantages, particularly in the form of lower costs of trading, underwriting, and marketing. He showed that pioneers capture shares which are "...almost 2.5 times as large as the followers in those markets" (Tufano, 1989: 231). Such advantage seems to remain consistent in subsequent years of the life of the product. The same firm is shown to capture substantially less share with imitations than with innovations. This can be observed in Table 4.

Tufano's data showed that pioneers did not charge higher prices for underwriting than later entrants, and, by charging similar or lower prices, generated larger market shares. Thus, pioneer advantages were reaped primarily from lower costs of trading and from secondary trades and not from increased revenues accrued through higher pricing. Tufano's (1989) study suggests that innovation provides banks with sources of information that allow them to reduce information search costs, thus reducing the difficulties involved in further pioneering. This suggests, in turn, that certain banks tend to be more innovative than others (as is also apparent in Table 4) The findings, however, have not been confirmed with additional studies.

Table 4 Percentage of the dollar value of offerings of 35 imitated financial innovations captured by investment banks in markets in which they underwrite the initial pioneering deal versus those in which they offer imitative products.

	Markets in which bank pioneers the product		Markets in which bank offers an imitative product	
Investment bank	**Number of products innovated**	**Average share as pioneer (%)**	**Number of products imitated**	**Average share as follower (%)**
Salomon Brothers	7	47.8	16	18.7
First Boston	6	54.4	12	16.8
Morgan Stanley	5	45.3	12	18.3
Goldman Sachs	4	35.5	10	12.4
Shearson Lehman	4	47.3	15	15.8
Merrill Lynch	3	37.4	12	23.0
Smith Barney Harris	2	54.7	2	1.4
Blyth Eastman Dillon	2	61.6	1	42.9
Drexel Burnham	1	69.2	7	15.1
Bear Stearns	1	11.7	3	4.5
Shearson Loeb Rhodes	1	62.2	1	0.6
Mean		47.9		15.4

Taken from Tufano (1989).

Studying innovation in services from the perspective of the pioneering literature should be enlightening. As economies become more service-oriented, the R&D function

within service firms emerges. Practitioners should benefit from guidelines that can help to determine expected returns from products entering markets at different stages of market evolution.

Moreover, the need to explore these issues is particularly interesting in services because there are possibly important differences between services and consumer or industrial products. These differences occur along many dimensions. For example, all products are bundles of physical objects and intangible attributes Many services, however, have a high degree of intangibility. This makes it difficult to assess the needs of the customer before creating a product and to measure objectively the satisfaction derived from purchasing a service (Bitran and Lojo, 1993) This thereby adds complexity to the design and testing of services, thus increasing the risk associated with new product development (Anderson, 1987) Moreover, some services must be delivered at the moment of their inception. For instance, customers must be present to receive services like transportation, hotel accommodation, health care, and the like. When such services are generated, they are consumed at once The act of producing and consuming the product occurs, therefore, in many cases, simultaneously, and such services cannot be inventoried for later use. Although the assets necessary to generate a service can, of course, be kept ready to deliver, the product per se cannot be delivered except in real time (thus, yesterday's unused hotel room or airline seat is lost forever and cannot be inventoried for later usage).

It is also salient that many services have to be delivered by humans, have the customer as their primary input, or both. Health care, for example, is delivered by humans to humans. Patients are the "raw material" of very complex production processes. For this reason, each delivery is, by definition, different. As Bitran and Hoetch (1990. 89)

note, in some services "it is not sufficient to define quality simply as 'conformance to specifications', because the human encounter cannot be completely specified."

Finally, newly created service products or processes are very difficult to protect (although, of course, not impossible[1]). Bitran and Lojo (1993) attribute this lack of appropriability to the intangible nature of services.

These differences do not necessarily imply a difference in the fundamental nature of innovation. The phenomenon of innovation, its motivations and related mechanisms, are, in all industries, events of similar nature that have some parameters that take on different values (Geoffron, 1992). In financial services in particular, two parameters are highly relevant to the dynamics of innovation: increased volatility with respect to the environment and, most importantly, a very weak appropriability regime. Marshall and Bausal (1992), for instance, argue that environmental factors have contributed to the creation of many new financial instruments during the last 20 years.[2] Among the factors responsible for such increase in environmental volatility are: frequent and abrupt changes in prices, the globalization of markets, regulatory changes, technological advances, advances in financial theory, and others (Marshall and Bausal, 1992). For instance, the augmented changes in the speed, frequency, and magnitude of price variations requires the creation of new financial schemes to manage the associated risk. This results in a more rapid diffusion and a reduced duration of the transient monopoly allowed to innovators. In this regard, Tufano (1989) reports, for a sample of 58 innovations in the securities industry, that rivals enter the market less than one year after the pioneer in 60% of the

[1] There is an increasing interest in the possibilities of patenting financial innovations. See for example Petruzzi, Del Valle, and Judlowe (1988).

[2] Finnerty (1988), for instance, compiled a partial list of over 100 instruments created between the early seventies and 1988.

cases. The mean number of deals the pioneer is able to close before rivals enter is in all cases less than two.

The feebleness of appropriability regimes in services stems from several causes. First, little protection is allowed either in the form of copyright or trade secret laws. In financial services, for example, very few patents have been awarded for new products. When Merrill Lynch was awarded a patent for its Cash Management Account, the company was able to obtain it on the grounds that it was a novel computer program. Patents are awarded to tangible things. In financial services patents may only be given to systems (for example, mechanical or electronic systems) that make the product somehow different or that serve to operate it. In these weak appropriability regimes, new services are copied and improved after very short periods of time (Bitran and Lojo, 1993). In the case of financial services in the United States, the Securities and Exchange Commission (SEC) in many cases forces "inventors" to disclose detailed information about the products they create (Tufano, 1989). In spite of this, numerous financial instruments are created and marketed every year. As Miller (1986 459) indicates: " ..the word revolution is entirely appropriate for describing the changes in financial institutions and instruments that have occurred in the past twenty years." These innovations include securities (zero coupon bonds, junk bonds), consumer-type financial instruments (debit cards, credit cards), process innovations (ATMs -automated teller machines, CMA -cash management accounts, EFTs -electronic fund transferring) and financial strategies (LBOs -leveraged buyouts, swaps, corporate restructuring) (Finnerty, 1988; Miller, 1986). In this regard, developing new financial products requires large financial outlays (Tufano, 1989). Clearly financial innovation, which implies the commitment of a great deal of resources into the development process, is undertaken as a profit-maximizing activity (Tufano, 1989, Anderson and Harris, 1986). This is carried out despite imitators needing to invest only a

fraction[3] of the innovator's original investment to replicate a financial product and to sell it in the market, not worrying about infringing any patent law. As a result, in many services product life cycles in some industries are short, and in some, ephemeral. This is especially true in many types of financial services, as we saw for the case of securities (Tufano, 1989), where products are copied almost instantaneously and development cycles must be reduced to the order of months (Quinn, 1992).

Levin et al. (1987) argue that firms use alternative means to protect the competitive advantages of new or improved processes and products. They identify six mechanisms firms use to appropriate the returns of innovative activities: 1) patents to prevent duplication, 2) patents to secure royalty income, 3) secrecy, 4) lead time, 5) moving quickly down the learning curve, and 6) sales or service efforts

Patents are not very effective as a means of protecting innovations except in very few industries. As Von Hippel (1988. 47) indicates:

> The real-world value of patent protection to innovators is a much-examined question. A series of studies conducted by several authors over a span of nearly 30 years (1957 to 1984) have asked whether inventors find patents useful for excluding imitators and/or capturing royalty income. The answer uniformly found. The patent grant is not useful for either purpose in most industries.

Though generally ineffective, patents do appear to offer some protection in certain industries. For instance, patents are particularly effective in the chemical and pharmaceutical industries but ineffective or not more effective than some other alternatives in the electronics and the telecommunication industries.

Similarly, secrecy appears to offer little protection to innovators. Von Hippel reports the existence of informal know-how trading among specialists in a given discipline.

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[3] 25% to 50%. Tufano 1990

These specialists might find it economically reasonable to trade information that could be considered proprietary, even with rivals (Von Hippel, 1988).

Given the relative inefficiency of some forms of appropriation in certain contexts, firms probably utilize a combination of means of appropriation that is likely to be cost-effective. That is, depending on the industry, the relative inefficiency of some appropriation methods is likely to be balanced with a greater emphasis placed on other alternative methods. In financial services, patents and secrecy are nonexistent or ineffective. Moreover, products, once released, are relatively easy to imitate. Bitran et al. (1993) report that:

> In the financial services industry, whenever an institution introduces a new type of account, others not only copy it very quickly, but often introduce an improved service since they have some time to assess the strengths and weaknesses of the original service. In order to be a leader in the service industry in terms of new product introduction, therefore, it is important to have the next service almost ready by the time the first one is introduced.

A plausible alternative way to protect and derive rents from innovative activity is to introduce products that are hard to copy. This is difficult in some financial services, as Bitran et al. (1993) indicate, because products are not intrinsically complex. The process of creation may be complex, involving high doses of creativity and the participation of specialists from different areas, but replication is easy. Tufano estimates that the cost of replicating a financial product is on the order of 50% to 75% less than the innovator.

Even products that require intricate technological or institutional networking that may render them a bit more difficult to replicate are not necessarily difficult to copy. As Morone and Berg (1993) indicate, "... the relative benefits of pioneering versus fast following are particularly open to question since information technology can often be

quickly copied, and later entrants often enjoy the benefits of lower-cost hardware." Hence, adding complexity to products through a more intensive use of information technology or other means will not necessarily cause delays in product diffusion or in competitors' movement down the learning curve.

Given this, we would expect that, at least in financial services, pioneering should be an important form of appropriation if not the dominant one. If patent-related protection and secrecy are ineffective and, for all practical purposes, absent, and moving down the learning curve occurs almost instantaneously because of the relative simplicity of the products, then lead time (being first to market) and a quick response in introducing new products might be the most effective methods of appropriating the returns of innovation efforts in financial services.

No study, however, aside from Tufano's, has looked into this problem in depth The literature on pioneering advantages has primarily concentrated, as we saw, in packaged goods aimed at consumer markets. For these types of products it has been determined that, in general, market share is inversely (though not necessarily linearly) related to order of market entry.

The literature on pioneering advantages does, however, contain a number of problematic aspects. a) The dynamics of order of entry are sometimes evaluated disregarding the characteristics of firms that launch the new products. Thus, whether products fail because they lack strategic relation with other products in the firm's portfolio, or for other reasons not related to order of entry, is seldom studied.

b) The literature sometimes identifies as first entrant a product that first "achieves national distribution" (e.g., Urban et al., 1986) or requires that the product be supported by national advertising (e.g., Whitten, 1979). "Hence, if a firm does not have national advertising or national distribution in a national market, it does not qualify as an entrant."

(Robinson, Kalyanaram and Urban, 1994.2). This might be problematic because indirectly it means that the product that qualifies as an entrant has been launched by a firm that has an important set of complementary assets (i.e., being able to nationally advertise or distribute), thus precluding many products launched by smaller firms. By using this methodology one runs the risk of confounding "entry" with financial muscle. The method also censors entrants that have failed to stay in the market, thus overstating the effect of entry on the survivors.

c) Units of analysis tend to vary. Some studies center their attention on products while others analyze organizations. Making generalizations from the literature as a whole is difficult.

d) Censoring. Many studies cannot or do not consider the products' entire history, thus overestimating or underestimating pioneering.

e) A rapidly changing market may defy order of entry dominance, especially if subsequent entrants in a very volatile environment are able to incorporate into their products characteristics that take such changes into account.

f) Finally, premature market conditions (i.e., pioneering "too early") may also obscure the effect of order of entry. Pioneers may end up bearing the weight of educating future consumers or creating network externalities yet unconsciously level the field for others to invade it.

As a result, though empirical results appear strong, empirical generalization is controversial. Some of this controversy is discussed by Golder and Tellis (1993) who, using an historical approach, argue that moving first achieves no advantage. On the contrary, they show for a variety of products that almost all of those who have moved first have died in their youth. Golder and Tellis do not require the pioneer to reach any specified scale of commercialization and many of those pioneers do not have a meaningful

share of the market in the long run. In their methodology, Golder and Tellis gather information from articles some as far back as 1842 to prove their point. Though this historical approach solves the problem of reverse causality (i.e., high market share firms being identified quasi-automatically as pioneers), it can also overlook other entries into the market that are not well documented.

Such aspects should be taken into account when choosing an appropriate methodology to study the phenomenon in financial services.

Hypothesis

On account of the aforementioned we hypothesize first mover advantages for financial services innovations:

> H: There is a negative relationship between order of market entry and market share of financial services innovations, controlling for firm size and product interrelatedness.

This proposed relationship falls in line with the same empirical regularity that has been discovered in many consumer products, in particular the pharmaceutical industry and consumer packaged goods (Robinson, et al., 1994), but runs contrary to the findings of Golder and Tellis (1993).

Methods

The study is based primarily on historical analyses. Product histories for several financial products are assembled and reconstructed using archival records. These records are information available in published sources of information (which include primarily newspapers, trade journals, and research papers) and from other sources such as regulatory institutions. The historic information is then validated with data from informants in pertinent institutions and by others familiar with the industry.

For convenience of data gathering, the sample chosen is a set of financial services launched in Costa Rica within the past 15 years. A sample of 36 entries in three product lines (credit card, debit card, and pension fund) is used. Thus, through this choice of sample we are trying to minimize the problem of lack of fine-grain data. This study is part of a larger one in which product line histories of commercial banks were reconstructed for a sample of Costa Rican financial institutions. For the purposes of this paper, however, we included only those products whose histories were reconstructed in detail. This was done with the intention of a) correctly identifying pioneers, b) avoiding censoring, and c) choosing products which had been launched in roughly similar time-frames (to control for potentially different market effects when agglomerating the sample)

The sample of products was circumscribed purposefully to a small market under progressive deregulation, and, thus, historical information could be obtained to permit an accurate determination of pioneering and subsequent entries. Moreover, the industry in which these products have flourished provided an interesting case for studying service-related innovation. No more than 20 years ago, the commercial banking sector in Costa Rica was a heavily protected and regulated domain. Economic deregulation dramatically changed the structure of the industry since 1980 and companies that were confined to specific domains of activity were allowed to offer new services in areas that had

traditionally belonged to banks. All financial institutions have been forced to renew and offer a wider range of products in order to remain competitive. Over 15 years, innovation and the development of new products in the financial services industry have become increasingly important.

Our choice of sample includes products that have been created in the near past. This allows for a relatively simple process of information gathering from public records. It also permits us to gather first-hand information from people who participated in the launching of the products. Another important advantage is that we were able to assess the dynamics of the dependent variable, market share, over time. Moreover, we chose product-lines whose history could be reconstructed through comparison and contrast of several data sources. Thus, we were trying to avoid overreliance on single informants within organizations who may overstate pioneering status, or whose recollections might not be entirely accurate. To avoid these problems, multiple measures were collected both from organizational informants and from secondary sources, allowing us to cross validate and triangulate data from different origins (scholars, experts, journalists, etc.), particularly sources who were not interested in overstating the pioneering status of a particular firm.

An important disadvantage with the chosen sample of products is that we may in fact be censoring the dependent variable, since it is plausible that not enough time has elapsed for assessing the survival and performance of the different market entrants. In this case the long term may not yet be long enough.

Although historical analysis is little used in studies of pioneering carried out in the marketing field, it has been widely used in studies of technological innovations. Of particular interest are the studies done by Cooper and Schendel (1976), David (1986, 1992), and Utterback (1994). All these authors incorporate a strong historical component in their work.

The dependent variable in this study will be total market share of the nth entrant at the time of the study, measured as percentage of total customers using a particular financial instrument and, alternatively, as percentage of total portfolio of dollars committed to the financial instrument. Data sources for this variable included informants' reports and archival data. Archival data were obtained primarily from financial periodicals. A manual search of all the issues of the four most important local business, financial, and economic journals since 1985 (and a selective search of some older issues) was coupled to both electronic and manual searches of the countries' most important newspapers. We also searched several libraries in the country (for example universities' libraries, the Central Bank Library, the library of the Stock Exchange Commission, and several others) for sources of information which included books, unpublished theses and papers, and monographs. In all we were able to assemble over 100 articles or printed pieces of information which referenced the product lines under scrutiny. This information was validated with data provided by organizational level informants and three industry experts For pension funds we contacted an incipient Pension Fund Regulatory Commission which required all pension fund operators in the country to report data on portfolio size, number of customers, and the like. When we found contradictory information we either sought a third piece of confirmatory evidence or asked an industry expert for clarification. Because the products were recent, confirmatory evidence was generally found with only a moderate degree of difficulty.

The order of market entry will be used as an independent variable. Pioneers are operationalized as the first entrant. Time of entry was obtained using primarily informants. Most organizations had personnel who were able accurately to recall the time of entry of their product. This was confirmed with archival data and, in the case of

pension funds, with the date reported to the Pension Fund Regulatory Commission as the first year of operation.

An additional independent variable will be the elapsed time delay since the first entry until the nth entry. The rationale here is that the impact of being the nth entrant will vary depending on the time elapsed since the first entry. Elapsed time was easily determined once we had dates of product introduction per institution.

The institution's size, in terms of total number of employees at the time of the study, will be used as a control variable. Number of employees is highly and positively correlated with total assets. These size measures are a proxy for the bank's ability to leverage existing resources to support a product in terms of advertising expenditures, reputation, and distribution channels. This information was obtained through informants within the organizations.

Relatedness with the rest of the institution's products can also have a moderating effect upon the outcome variable. People may be inclined to switch to certain institution's products because of the added convenience of carrying on all businesses with one organization. For this purpose a measure of strategic focusing was used. The dispersion of the point cloud on the client-product matrix of each institution was used as a measure of product interrelatedness. Institutions with larger/ampler arrays of products and clients may be better positioned to leverage new product offerings[4]. An alternative measure, which quantified the change in the dispersion of each bank's product cloud, was also used as a measure of interrelatedness (small values indicating small departures from current product offerings).

Finally, a dummy variable was used for assessing the regulatory effect upon the hypothesized relationship. This dummy was assessed with the help of three industry

[4]Please see Appendix 4 for details.

experts who were independently asked which of the product lines was influenced by regulation (when operation required permission from the regulator, or when the regulator only permitted certain institutions to operate at the time of entry).

The model to be tested can be summarized as:

$$S_{nc} = E_{nc}^{\alpha 1} T_{nc}^{\alpha 2} A_{nc}^{\alpha 3} R_{nc}^{\alpha 4} G_{nc}^{\alpha 5}$$

where,

S_{nc} = market share of the nth entrant in category c, in percent

$E_{nc}^{\alpha 1}$ = Order of entry of nth product in category c

$T_{nc}^{\alpha 2}$=Elapsed time delay between nth entry and the first entry in category c, in months

$A_{nc}^{\alpha 3}$=Relative size of institution that released the nth product in category c (measured as a ratio of total employees with respect to largest entrant in category)

$R_{nc}^{\alpha 4}$=Index of product relatedness for bank releasing product n in category c

$G_{nc}^{\alpha 5}$=Regulatory variable (dummy variable, dichotomous).

Following a section of exploratory data analysis, we will fit a taxonomy of regression models.

Results

Qualitative Analysis

In general, all products examined here present different patterns of entry, exit, and seemingly different relationships between order of entry and performance. For some products, particularly those which only add features or are exclusively driven by changes in regulation, the effect of pioneering upon performance seems to be small. However, strategic products that enter the market in the absence of regulation reveal an apparent expected negative relationship between order of market entry and measures of performance.

Pension Funds.

Pension funds in this market had traditionally been administered by the state. Economically active people contributed a fixed percentage of their salaries to a national fund. In such environments, private pension funds tend to be successful if the state-operated pension system gives small pensions at high retirement ages. In such a case, customers would have an incentive to transfer to funds that offer more benefits Problems with the state-administered fund opened an opportunity for other institutions to enter the market and offer complementary pensions. This industry operated with little or no supervision until July of 1995. In fact, before that time, private pension funds could not operate openly as such, but only as providers of additional coverage to that given by the state. Even so, the first private pension fund operator entered the market in August of 1988. In 1995 the funds were authorized to operate as such and also received an

additional impulse in the form of a tax break[5]. Ten more operators entered the market between 1991 and September of 1996. Table 5 summarizes the order of market entry, the number of clients, and the size of the portfolio for the last three years.

Table 5. Raw data set for pension funds.

Fund	Date of entry	Order of entry	Portfolio, 1996 (m.u.)[2]	Customers Sept. 96	Portfolio Dec. 95 (m.u.)[2]	Customers Dec. 95	Portfolio Dec. 94 (m.u.)[2]	Customers Dec. 94
PF1 (B)	Aug 1988	1	20,000	52,000	11,580	45,000	8,335	37,714
PF2 (P)	Nov 1990	2	1,800	27,000	1,500	25,000	1,277	17,000
PF3 (I)	July 1991	3	1,208[1]	23,344[1]	1,800	18,000	665	15,187
PF4 (B)	Aug 1991	4	n.a.[3]	2,250	610	2,000	243	1,015
PF5 (B)	Jan 1993	5	10,400	25,983	4,300	17,340	1,600	12,131
PF6 (B)	May 1993	6	2,600	41,500	1,400	38,000	528	24,046
PF7 (B)	Jan 1995	7	3,100	6,890	330	1,800		
PF8 (B)	Jan 1996	8	n.a.[3]	920				
PF9 (B)	Mar 1996	9	850	1,100				
	TOTAL		39,958	180,987				

[1]April 1996 [2]Millions of monetary units [3]No reliable data were found for these cells
(B) Bank, (P) Pension Fund Operator, (I) Insurance Company

Different types of institutions entered this market. The most prominent participants are banks, but there is also one insurance company (PF3), and one company that exclusively operates the pension fund as its sole product (PF2).

Figure 2 is a scatterplot that shows order of market entry versus percentage of total market share (as of 1996) for all incumbents in the pension fund industry. Market share is measured as percentage of total customers. Inspection of this scatterplot reveals an apparent negative relationship between order of entry and market share. After an elapsed time of approximately seven years, the pioneer still holds the largest market share.

[5] A portion of the funds saved could be deducted from income tax.

When % of market share is measured in terms of portfolio size (not shown on graph), the pioneer also appears to retain an important portion of the market.

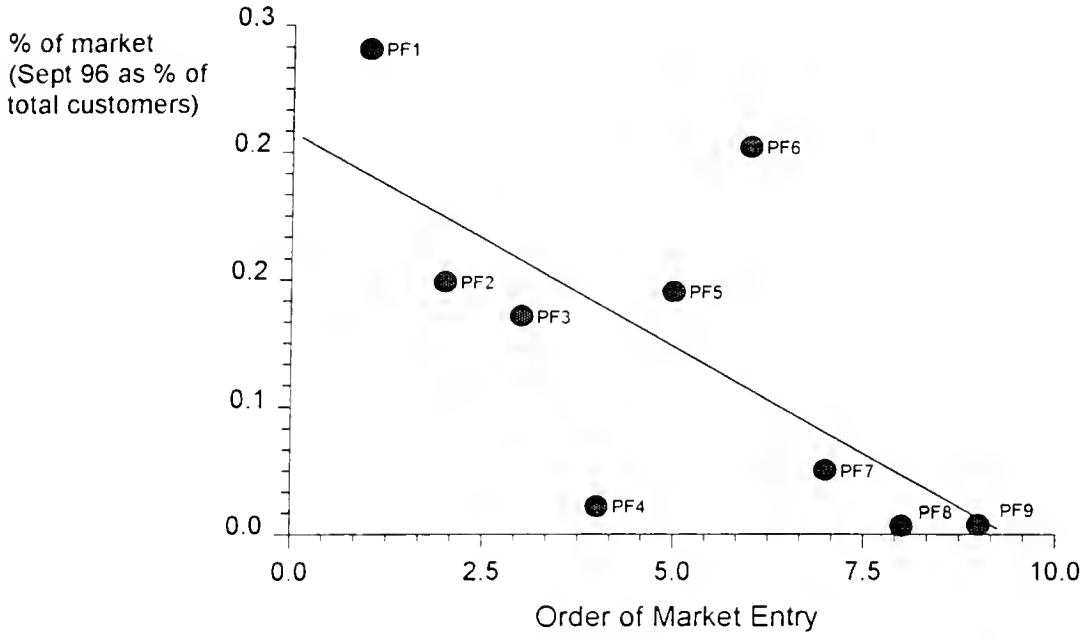


Figure 2. Order of market entry vs. market share for pension funds. Market share is measured as % of total customers as of Sept 1996.

Figure 3 shows a longitudinal history of total market shares (measured as % of total customers) for all participants. The pioneer in this market was able to operate alone in this market for a total of 23 months. Firms' market shares start leveling off after approximately 4 years since the first entry. According to these graphs and data, an early pension funds entrant gained a maximum market share over time that is approximately 50% of the pioneer's share. In this case, not considering the one apparently atypical data point (PF6), firms that entered the market within an elapsed time delay between 27 and 57

months eventually averaged 57% of the pioneer's share. Very late entrants appear to have stabilized with market shares that represent approximately 5% to 10% of the pioneer's share (8% in this case).

Figure 3 Order of market entry vs market share for pension funds

Other factors, however, particularly organizational size, seem to have an important effect upon market share Figure 4 shows a scatterplot of order of entry vs. percentage of the pioneer's market share (measured as the relative size of its portfolio vs. that of the total market). The squares represent this percentage for the year of 1994, the triangles say the same for the year of 1995, and the circles represent this percentage at the end of August of 1996. Symbol size is an indication of organizational size (the larger the symbol, the larger the size of the institution measured in total number of employees). Inspection of this scatter plot reveals an apparent influence of size upon the dynamics of an incumbent's market shares Notice that entrant number five, which is also the largest as measured by

symbol size, increases its market share noticeably in three years, signaling the possibility of combining the pension fund business with a larger platform of products, thus being able to offer more complete product packages to customers. A similar effect is observed in entrants 7 and 8, also banks, but it is not observed in entrant number three (which exclusively operates this pension fund) or number four (an insurance company). Size may also signal a greater ability to leverage sales efforts and achieve scale effects. The relationship between SIZE and market share is positive and significant for the years 1994 to 1996 (for 1996: S-r=0.70, $p<0.05$; for 1995 S-r=0.63, $p<0.1$; for 1994 S-r=0.61, $p<0.1$)

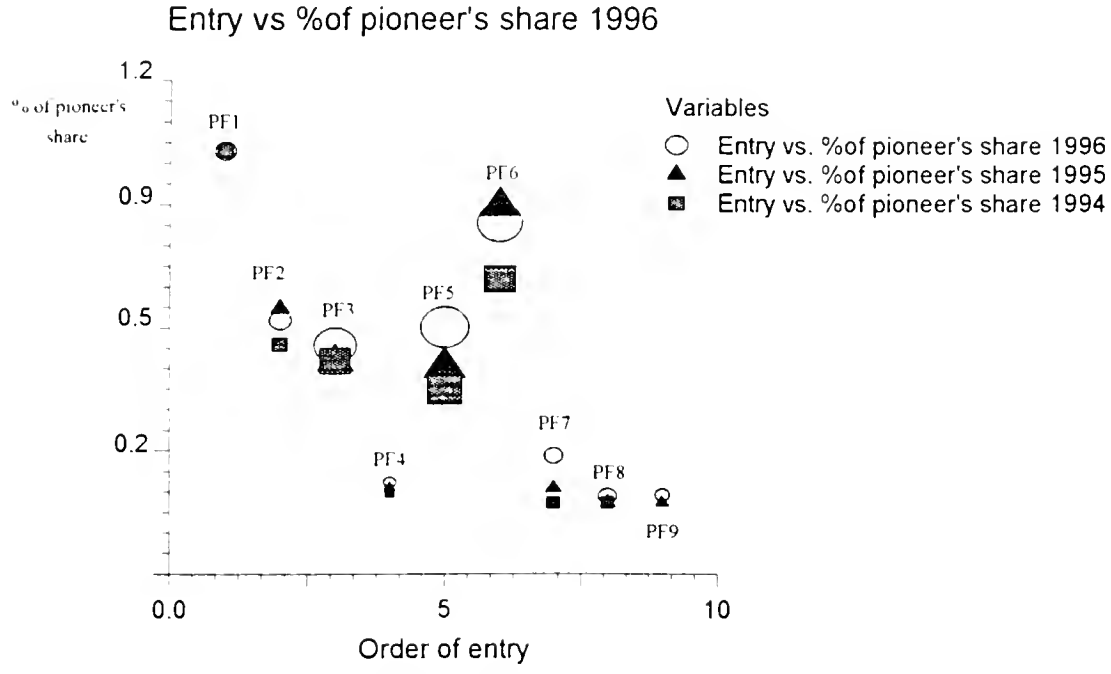


Figure 4 Order of market entry vs. pioneer's share for three years. Pension funds

Table 6 shows a matrix of Spearman-rank correlation coefficients for order of market entry and market share measured as a fraction of the pioneer's share (in terms of total customers) for the years ended in December of 1994, December of 1995, and August 1996.

Table 6: Spearman-rank correlations between the variable ENTRY and the variables SIZE and market share for various years (Market share measured as % of the pioneer's share in terms of total customers). Pension funds.

Variable	Spearman-rank correlation coefficient.
SIZE	-0.34
MARKET SHARE:	
%PION96	-0.72*
%PION95	-0.81**
%PION94	-0.80**

**p<0.01, *p<0.05

As expected, a negative relationship between order of entry and market is fairly strong and statistically significant throughout (only last three years shown). Throughout these years the relationship conserves the expected direction, but its coefficient starts to decrease (from 0.8 to 0.72), presumably because other variables start exerting influence upon the outcome variable market share. Table 6 also suggests that there is no significant relationship between order of market entry and SIZE. Larger institutions (or smaller ones) are not, according to these data, the first ones or the last ones to enter the market.

These data on pension funds seem to indicate that there are some rewards for the pioneers. But these advantages are, however, quickly overcome by other factors associated with some organizational characteristics of subsequent entrants. Later entrants

into this financial market are not delayed by any sort of proprietary considerations, hence the pioneer enjoys only a relatively short period to operate as a monopolist.

Debit Cards

Debit cards were recently introduced into the financial system under study. This payment instrument requires the cardholder to have a checking account with the issuing institution, with the debit card serving to automatically and electronically deduct payments from the checking account. The product requires a fairly extensive network of affiliated businesses. Moreover, debit cards become more useful if they can also be utilized to obtain cash from automated teller machines or from bank offices. Hence, a priori, one would expect large banks, or banks with extensive geographical coverage to be more successful in this market.

Table 7 Raw data for debit card industry.

Operator	Date of entry	Order of entry	Customers as of 10-96	Tot. assets, 12/95 (m u)[1]	# employees
DC1	Aug-87	1	46,689	307	3,200
DC2	Dec-88	2	60,000	170	2,662
DC3	Jan-89	3	305,000	73	875
DC4	Oct-93	4	9,600	24	362
DC5	May-96	5	26,500	2.2	300
DC6	Jun-96	6	3,500	5.8	105
DC7	Sep-96	7	850	13	180

[1]Millions of monetary units

The first debit card entered the market being studied in August of 1987. Six additional operators had entered the market by 1996 and another two were planning to enter soon. Table 7 summarizes some characteristics of these operators. All debit card institutions are commercial banks. The above data reveal a fairly short elapsed time between the pioneer and the next two entrants. A wave of new entrants occurs in 1996, caused by regulatory changes that allowed all banks to provide regular checking accounts This change made it unnecessary for banks to circumvent this regulatory constraint, which they often did, through alternative and more creative means.

Figure 5 is a scatterplot that shows order of market entry versus percentage of total market share measured as % of customers for all participants in the debit card industry at the time of the study Inspection of this scatterplot doesn't suggest the presence of a negative relationship between order of market entry and long term market share The pioneer doesn't have any significant advantage. It is the third entrant who is able to capture market share. The pioneer's market share, in this case, is approximately one sixth of the third entrant's market share A very late entrant (with a total elapsed time of 106 months after the pioneer's entry) appears to capture approximately 50 percent of the pioneer's share in a relatively short period of time.

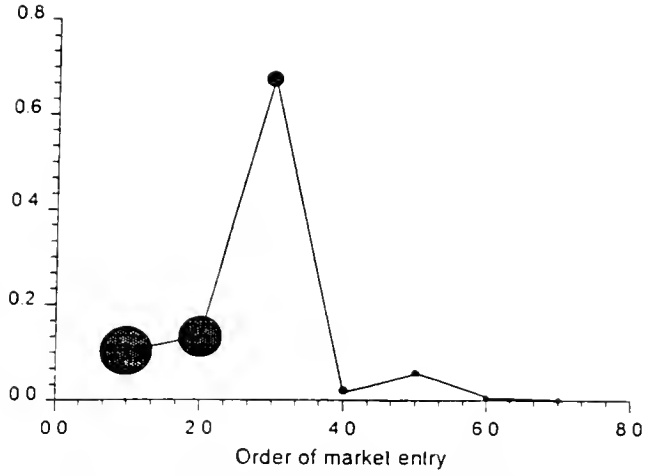


Figure 5: Order of market entry vs. market share for debit cards. The size of the datapoints is an indication of the relative size of the institution.

No longitudinal data could be obtained for this product in particular. This notwithstanding, an examination, even a cursory one, is in order so that the effect of other factors may be inferred. It might be that this product has a much shorter life-cycle, and that additional factors have already overcome the effect of pioneering. In Figure 5 the size of the institution, determined by number of employees, is represented by the size of the data point. Obviously, the very large institutions entered this market first, perhaps suggesting that a minimum technological platform is necessary for firms to enter into this market because convenience to the customer drives the adoption of this product. Moreover, the product cannot be adopted in isolation. As a minimum, a checking account must be kept by the customer with the issuing operator. Convenience, however, may drive customers to adopt one or the other debit card, and this factor may quickly overcome the effect of early entry. Figure 6 shows, through the size of the data point, the number of ATMs each incumbent has. Entrant number three holds the largest number of

those by far, followed by entrant number five with 60% as many. Entrants 1 and 2 have nearly as many as entrant 5. Though this relationship evidently cannot be established with the cross-sectional information at hand, there is apparently a positive correlation between market share growth rates and # of ATMs.

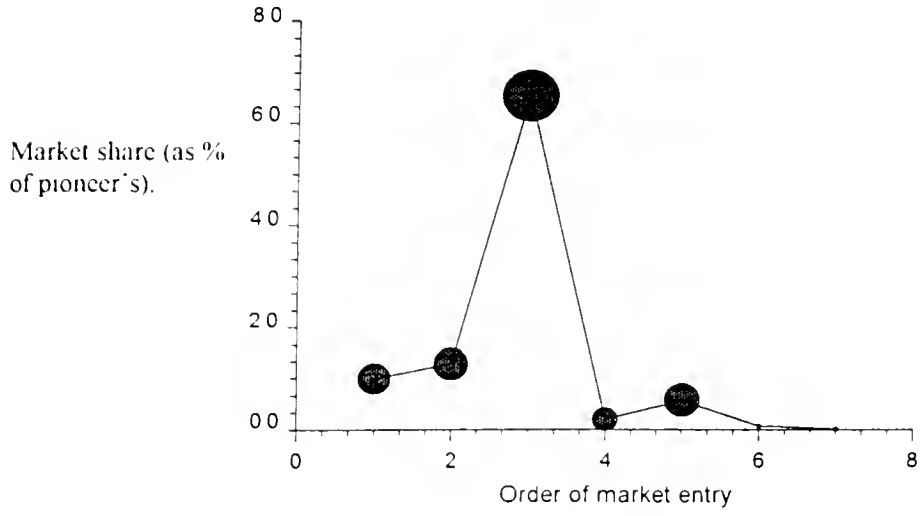


Figure 6 Order of market entry and market share as % of pioneer's market share for debit cards. The size of the data point is an indication of the number of ATMs each participant has.

The effect of entry may also be influenced by the time elapsed since the pioneer's entry. The absolute order of market entry could hide nearly simultaneous entries or entries which are separated by long periods of time. In Figure 7 we have plotted total market share at the time of the study against elapsed time since the pioneer's entry. Two groups can be clearly recognized in the graph. One group of early entrants introduced debit cards into the market within a total elapsed time of 17 months. The next entry

occurred 58 months later, and more than eight years after the pioneer's entry we can observe a second group of institutions entering the market.

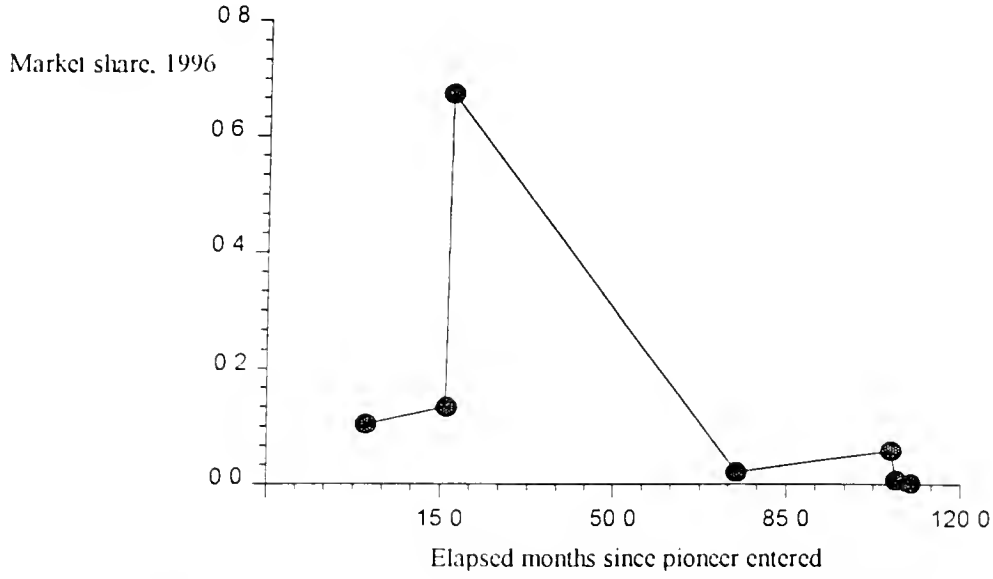


Figure 7. Elapsed time since pioneer's entry vs. total market share for debit cards.

Two observations are in order. First, the data on debit cards indicate the potential inconveniences of utilizing strict order of market entry as an independent variable. It might be preferable to moderate this strict order by coding entries as early entries, early followers, and so on. Alternatively, time elapsed since first entry could be used as an independent variable. Second, we can see that different motivations may stand behind different institutions entering a market. In this case, early entrants may well be termed as strategic while the later wave of entrants may just be taking advantage of a regulatory change.

Despite this, we do observe for the case of debit card introduction a statistically significant relationship between order of market entry and long term market share. Table 8 shows a matrix of Spearman-rank correlation coefficients for several variables of interest. We have included for reference purposes the variable CLIENTS (which is indicative of total number of customers), the two variables that measure size (in terms of total assets and total number of employees), and the variables ELAPSED and %PION_SHR. Notice that market share (as a % of the pioneer's share) is negatively correlated with order of market entry (and similarly, given that we are using ranks, with time elapsed since first entry). In this case the large established players entered first (time elapsed is negatively correlated with both measures of entrant size: S-r = -0.86, $p<0.01$ for SIZE1 and -0.96 with $p<0.001$ for SIZE2). The observed positive relationship between market share and number of ATMs is statistically significant at $p<0.01$. Though the table generally supports a negative relationship between order of market entry and long term market share, it is also important to note that examination of statistical models alone, without further exploratory data analysis, may give an incorrect picture of the phenomenon under observation.

Finally, the data suggest, though in this case no firm conclusion can be drawn, that other factors come into play that eventually dilute the pioneering effect. In this particular case of debit cards we observe that entrants with larger coverage (in the form of a network of ATMs) are apparently able to grow much more rapidly than pioneers. The data also suggest that, for this product, a much shorter transient monopoly existed than

for pension funds. Three firms entered the market within a period of 17 months. A second wave of entry, presumably driven by changes in regulatory conditions, occurred 58 months after. Nonetheless, very late entrants appear to stabilize with market shares which are less than 8% of total.

Table 8: Spearman-rank correlation coefficients for variables of interest. Debit cards.

	ENTRY	CLIENTS	SIZE1	SIZE2	ELAPSED	%PION_SHR
ENTRY	1.00					
CLIENTS	-0.82*	1.00				
SIZE1	-0.86**	0.61	1.00			
SIZE2	-0.96***	0.79*	0.89**	1.00		
ELAPSED	1.00	-0.82*	-0.86**	-0.96***	1.00	
%PION_SHR	-0.82*	1.00	0.61	0.79*	-0.82*	1.00
ATMs	-0.56	0.88**	0.23	0.56	-0.56	0.88**

*p<0.05, **p<0.01,***p<0.001

Credit Cards

The credit card is a relatively modern financial innovation but less modern than the debit card The first successful large scale implementation of the credit card was done by Diners Club in 1956 (Mandel, 1990) In 1958 American Express and Carte Blanche entered the business in the so called Travel and Entertainment segment of the industry. Bank credit card programs came later. In the United States the first credit card plan adopted by a commercial bank appeared around 1950. Apparently, by 1953 there were more than 60 active plans in the United States (Gibson, 1967). In 1955 there were about 100 banks offering credit card plans (Mandel, 1990). By 1966 this number had risen to 200 (Gibson, 1967). In 1972 there were 8,574 banks with credit card plans (Federal Reserve Bulletin, 1973). In terms of the number of banks with cards in the United States: in 1967 less than one in ten banks had credit card plans (Gibson, 1967), by 1972 60% of

all banks in the United States offered a credit card plan (Federal Reserve Bulletin, 1973), in 1979 71% of all banks had credit card plans; and in 1985 the figure had grown to 90% (Mandell, 1990). By 1976 there were two dominant organizations in the business (BankAmericard (later VISA) and Master Card). The growth of their total accounts is shown in Figure 8. Notice that explosive growth starts after 1975.

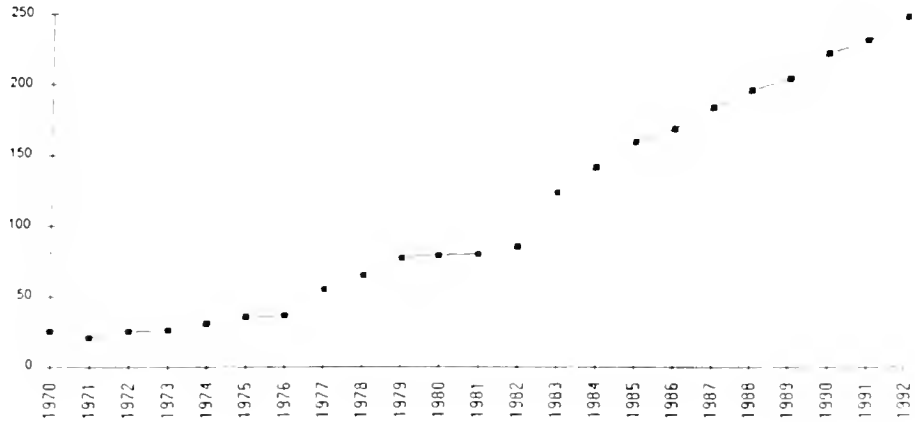


Figure 8 Growth of Credit Card accounts in the US (VISA and Master Card) Taken from Krumme, 1987

The first credit card plan in the financial system under study was created in 1976 by a commercial bank (this is a relatively early entrance even by U. S. standards). The second entrant appeared in the market after 108 months. In this environment pioneering advantages may have been obtained in terms of network externalities. Card operators derive income from customer's interest payments and also from the commisions paid by vendors, thereby making it crucial to develop a large network of affiliated businesses. Figure 9 displays a scatterplot of total credit card market share for three years (1993, 1994, and 1995) versus total elapsed time since the first entry. As shown, the very early

first entry doesn't sustain an above average market share over time. The second entrant (108 months after) captures approximately 45% of the market and retains it consistently. In this case it is not apparent that size of the institution or the plausible combination of this product with a more ample product platform is having any important effect. Moreover, it appears that large institutions (as indicated by symbol size) enter in a second wave of entry. In general, however, the observed scatterplot seems to support a negative relationship between order of market entry and market share.

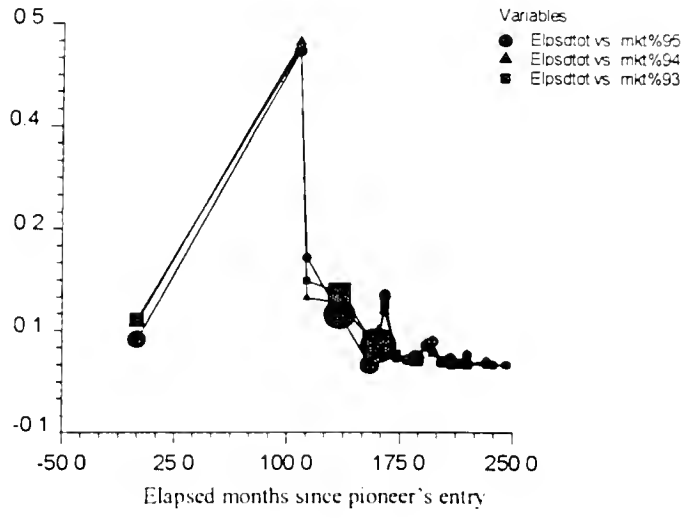


Figure 9. Elapsed total time in months since the pioneer's entry versus market share for credit cards. Market share measured as % of total customers.

Figure 9 reports total market shares for the credit card market and Figure 10 market shares measured as a percentage of the pioneer's share (in both cases as percentage of total customers). Notwithstanding that the pioneer had a period of approximately seven years operating as a monopolist, it fails to reap long term market

share advantages. In this case the second entrant became (and stayed) the market leader After this period another three competitors entered the market during a three-year period.

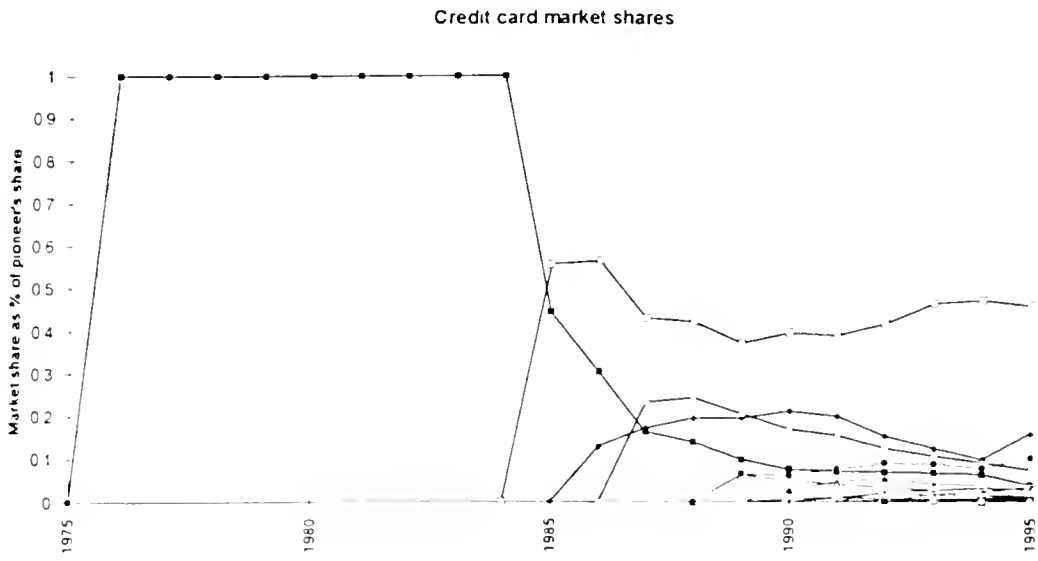


Figure 10 Market shares for credit cards

Notice also in Figure 11, that the pioneer retains the number of customers (in fact increases its number of customers somewhat consistently) despite losing market share. This may reflect different strategic intentions of the different firms. Moreover, the market is growing overall. This means that later entrants can grow without taking market share from other incumbents but rather from the intrinsic growth of the market, perhaps attacking different market segments. This may explain in part the absence of erosion of any type in the early entrants' total number of customers. Figure 11 shows that the second and third entrants into this market do exhibit consistent growth in the total number of customers they attract.

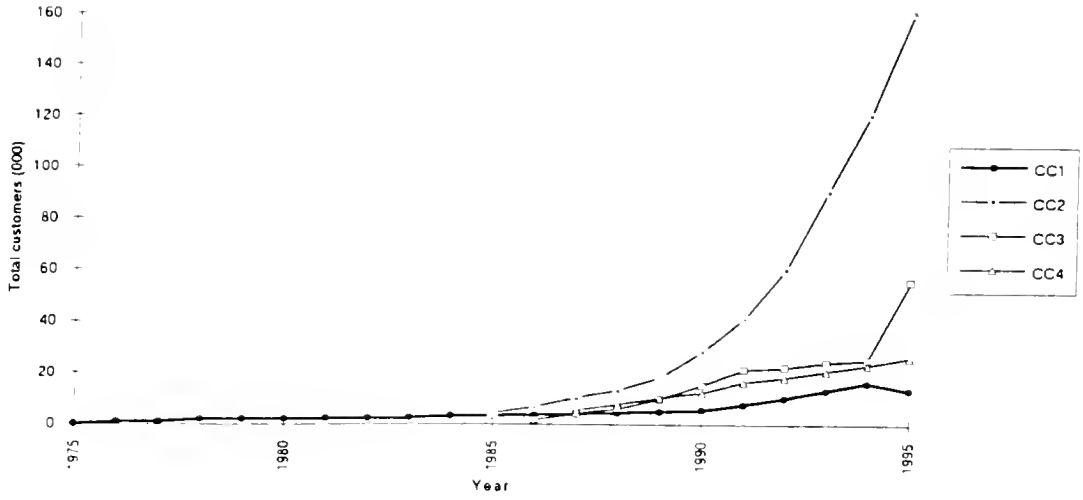


Figure 11. Total number of customers for participants in Credit Card business. Only first four entrants shown.

Table 9 displays Spearman-rank correlation coefficients for several variables of interest. Notice, as observed in the scatterplots, the strong negative relationship between elapsed time since first entry and market share in the credit card business. There is also a negative relationship between order of entry and market share. Though this relationship is statistically significant throughout, the coefficient becomes smaller as time passes (S-r coefficients of -0.94, -0.90, and -0 69, $p<0.001$). Notice also the statistically significant negative relationship between size (measured by number of employees) and entry (S-r = -0.69, $p<0.001$). As observed when exploring the scatterplots, large firms seem to enter later in this case. Finally, one can observe a positive relationship between all measures of market share for different years but, again, the sizes of the coefficients diminish. This could signal that the early entrants' market shares are starting to erode.

Table 9: Spearman-rank correlation coefficients for variables related to the credit card subsample.

	Entry	Size	Elpsdtot	mkt%95	mkt%94
Entry	1.00				
Size	-0.69***	1.00			
Elpsdtot	1.00	-0.69***	1.00		
mkt%95	-0.69***	0.43*	-0.69***	1.00	
mkt%94	-0.90***	0.63**	-0.90***	0.81***	1.00
mkt%93	-0.94***	0.59**	-0.93***	0.74***	0.91***

***p<0.001, **p<0.01, *p<0.05

Quantitative Data Analysis

To complement the qualitative data analysis and to test our hypotheses more rigorously, we constructed a dataset with the datapoints collected in all three product categories. Thus, the data set includes observations for a total of 36 entries in three product categories with the following variables. ENTRY (numerical variable containing the order of market entry), SHARE (% of market share for nth entry measured as percentage of total customers), ELAPSED (elapsed time in months for particular entry since first entry in the particular category), SIZE (ratio that gives relative size of entrant with respect to the largest entrant in the product category, calculated based on total number of employees), INNOV (measures degree of dispersion of product offerings for that particular institution; calculation based on matrix of clients and products, providing a measure of the firm's innovativeness as indicated in Appendix 4), and REGUL (dichotomous variable that indicates whether the particular product was driven by regulatory changes).

Our goal in this part of the paper is to build a sensible and efficient baseline model for the dependent performance variable SHARE, controlling for institution size, the effect of the institution's total product offerings, and the effects of regulation. We will then construct a model to include question predictors ENTRY and ELAPSED. Should a link exist between the question predictors and product performance, controlling for the aforementioned effects, practitioners could then design their product launching initiatives accordingly or, at least, qualify their perceptions about possible performance outcomes of financial products.

First, the raw data set and the distributions of all variables were examined. These are shown in Table 10.

Table 10. Descriptive statistics for selected variables

Variable	Mean	s.d.	Min.	Max.	Normality of distribution (^)
SHARE	0.083	0.14	5.75E-04	0.67	No
ENTRY	8.31	5.92	1	21	Yes
ELAPSED	125.42	79.48	0	246	Yes
SIZE	0.27	0.34	0.0078	1	No
INNOV	4.49	1.67	1	7	No
REGUL	.19*	0.40	0	1	No

(^) Determined through Kolmogorov-Smirnov test (at the 5% level)
*Dummy variable: the mean is interpreted as the % of entries that are considered to be driven by regulation.

This initial examination shows some factors worth considering. Mean market shares for the sample of three financial product lines is fairly small (8.3%). If we couple

this to the large average elapsed time since first entry (125.4 months), we can infer a possible negative relationship between elapsed time and share.

The average size of the institutions is approximately 27% the size of the largest institution in that product category. Given this, it is plausible that size will exert some influence on the outcome variable SHARE. Such presumption is reinforced with non-normalities observed for this variable.

In general, the non-normalities observed signal the presence of curvilinearity. A comparison of Pearson correlation coefficients with Spearman-rank correlation coefficients for the variables at issue rendered large differences for all bivariate relationships which included the variables SIZE and SHARE (as shown in Table 11), announcing the need for transformations

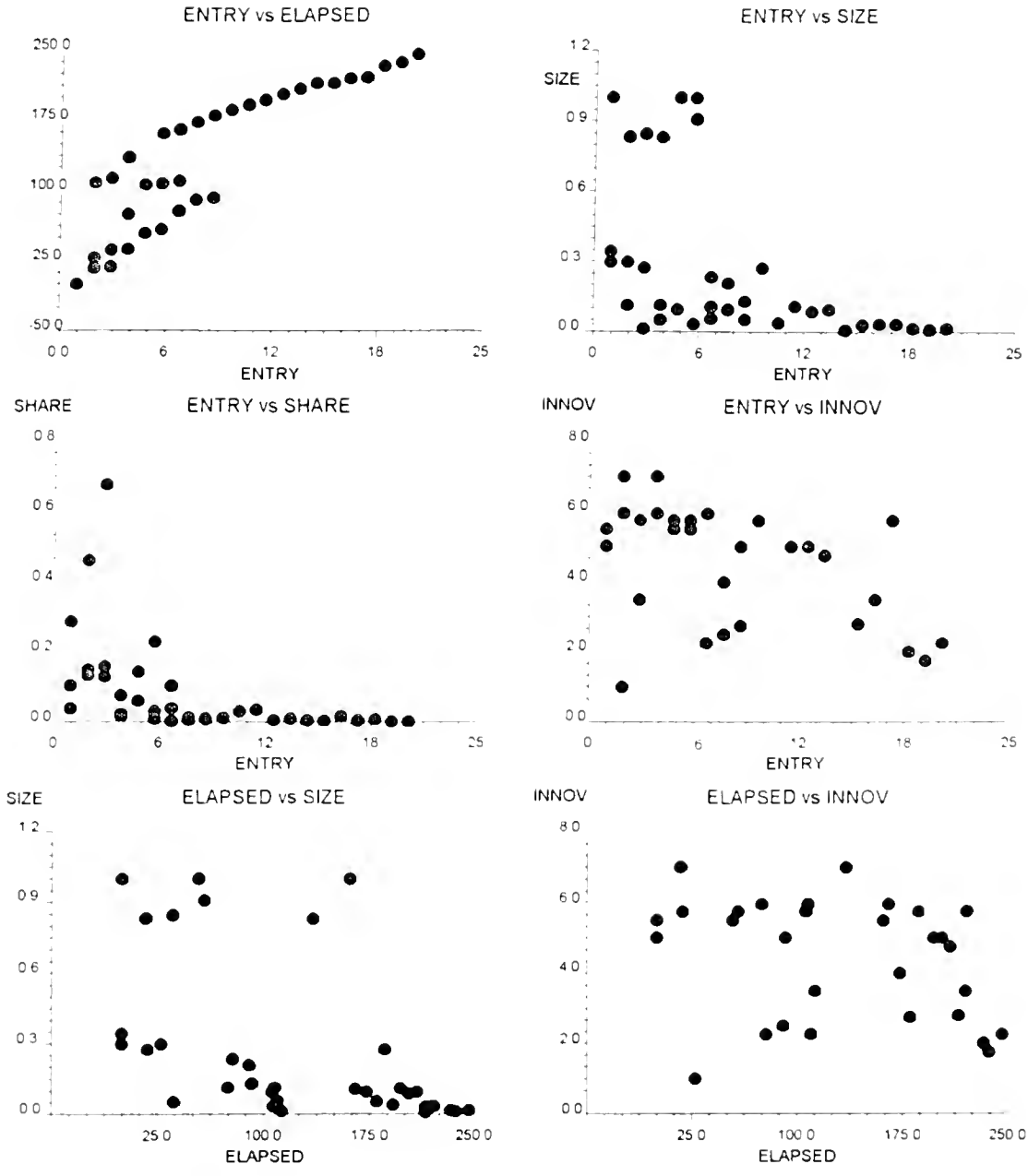
Table 11 Differences between Pearson and Spearman correlations (pair-wise deletion)

	Variables				
Variables	ENTRY	ELAPSED	SIZE	SHARE	INNOV
ENTRY	0.00				
ELAPSED	-0.02	0.00			
SIZE	**0.17**	**0.22**	0.00		
SHARE	**0.31**	**0.21**	**-0.43**	0.00	
INNOV	0.01	0.03	0.01	**-0.17**	0.00
REGUL	0.01	0.0	-0.02	0.09	-0.05

Further inquiry was performed by inspecting bivariate scatterplots of all variables. Selected scatterplots are included in Figure 12. In these plots the detected curvilinearities now become evident. A few other observations are in order First, we can see the strong

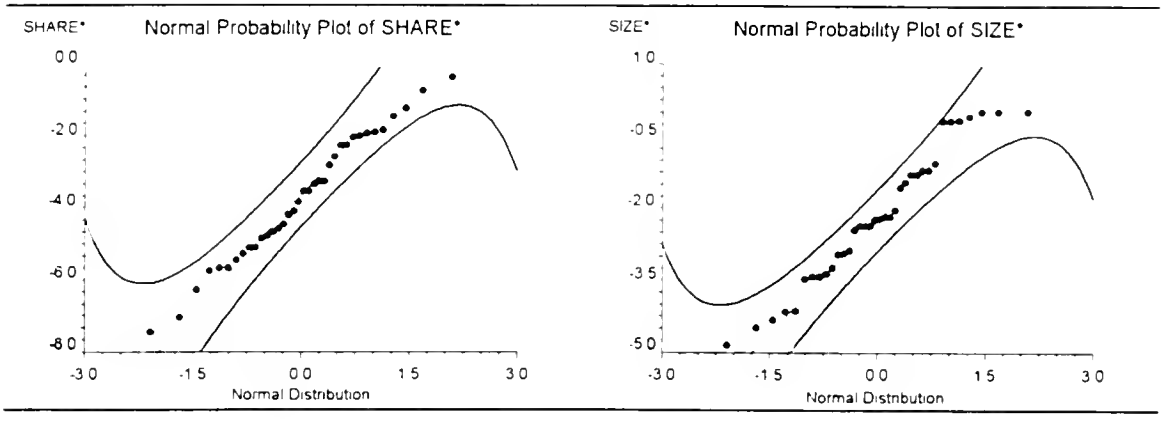
positive relationship between order of market entry and elapsed time. This relationship is not a straight line because of the different product categories present in the sample. Second, we can see that a group of notably larger institutions appear to have entered relatively early in the sample (though it is not clear whether such entries are prototypical for certain product categories). This clearly indicates the need to control for size in our analyses Third, there appears to be a clear negative and curvilinear relationship between order of market entry and market share. Fourth, inspection of the scatterplot of INNOV versus ENTRY appears to indicate a strong negative relationship between the two variables. This could indicate that those firms which have wider product platforms (more products aimed at various markets, i. e., more innovative in this regard) tend to enter first. This graph, however, does contain a few seemingly atypical data points. Fifth, although the scatterplot of order of entry (ENTRY) vs. SIZE suggests that large firms tend to enter earlier, the graph of ELAPSED vs SIZE suggests that this must be qualified if we consider real time. A similar thing happens when we look at the relationship extant between ELAPSED and INNOV. This suggests that different results could be obtained when using either variable as predictor, thus pointing to the need for differentiating any implications in terms of order of entry and timeliness of entry.

Figure 12: Scatterplots for selected bivariate relationships.



As suggested by the results of the exploratory data analysis, we performed transformations on the variables SHARE and SIZE. Using Tukey's ladder of transformations and the Rule of the Bulge, we presumed that natural logarithms would perform best for these cases. We nevertheless tried several possibilities (shown in Appendix 1). In fact, the natural log of both variables seems successfully to restore linearity in the relationship. Then we proceeded with our data analysis utilizing the transformed versions of the original variables (which will be designated here as SHARE* and SIZE*). Bi-variate scatterplots confirmed that the selected transformations were adequate (see Appendix 2) Various analyses were performed to assess the convenience of such transformations Normal probability plots (coupled with Kolmogorov-Smirnov tests) showed that both variables had attained normality, as indicated in Figure 13.

Figure 13 Normal probability plots for SHARE* and SIZE*



A comparison of Spearman-rank correlation coefficients and Pearson correlation coefficients showed that the previously observed differences had been minimized (see Appendix 3). Once comfortable with the variables to analyze, we developed a table of bivariate correlations, estimated through Pearson correlation coefficients. This analysis, summarized in Table 12, revealed that the dependent variable SHARE* was strongly negatively correlated to both ENTRY (Pearson ρ = -0.78, $p<0.001$) and ELAPSED (Pearson ρ = -0.69, $p<0.001$). Moreover, the variable SIZE* is negatively correlated to ENTRY (Pearson ρ = -0.68, $p<0.001$) and ELAPSED (Pearson ρ = -0.67, $p<0.001$) and positively correlated to SHARE* (Pearson ρ = 0.64, $p<0.001$).

Table 12 Pearson correlations (pair-wise deletion)

	Variables				
	ENTRY	ELAPSED	INNOV	REGUL	SHARE*
ENTRY	1.00				
ELAPSED	0.89***	1.00			
INNOV	-0.45**	-0.31~	1.00		
REGUL	-0.36*	-0.40*	0.30~	1.00	
SHARE*	-0.78***	-0.69***	0.49***	0.15	1.00
SIZE*	-0.68***	-0.67***	0.53***	0.14	0.64***

***p<0.001, **p<0.01, *p<0.05, ~p<0.1

This confirmed the urgency of including SIZE as a control variable in the analysis. The variable INNOV has a strong positive correlation with SHARE (Pearson ρ = 0.49, $p<0.001$) and SIZE (Pearson ρ =0.53, $p<0.001$), thus indicating that it might be relatively large institutions that enter earlier and attain larger market shares. With respect to REGUL, we noticed a barely significant relationship (Pearson ρ = 0.30, $p<0.1$),

suggesting that institutions with a larger array of products are not necessarily the ones that move first in the case of regulation-driven entries. This interrelation is of course not conclusive given the dichotomous characteristics of the dummy REGUL.

Following these analyses, we established two classes of control predictors and one class of question predictor. We estimated that "networking effects" could take place, defined as alterations in total market share from entrants which are able to push average SHARE* up or down on account of their size and ability to network with an ample platform of products. Thus we classified the variables SIZE* and INNOV as control predictors. The variable REGUL was classified as a control predictor of the level to which entries are driven by regulatory changes The variables ENTRY and ELAPSED were established as question predictors in the analysis.

We noted that the relatively large correlations among practically all variables could result in multicollinearity problems. This will, evidently, become a problem in the case of the highly correlated and redundant variables, ELAPSED and ENTRY. It was decided, then, to build a sequence of nested models paying attention to the plausible occurrence of collinearity.

Three regression models were subsequently fitted and analyzed with the intention of creating an appropriate baseline model. First, SHARE* was regressed on ENTRY. Second, SHARE* was regressed on ELAPSED, and, finally, we used both variables as predictors in the regression analysis The results are summarized in Table 13

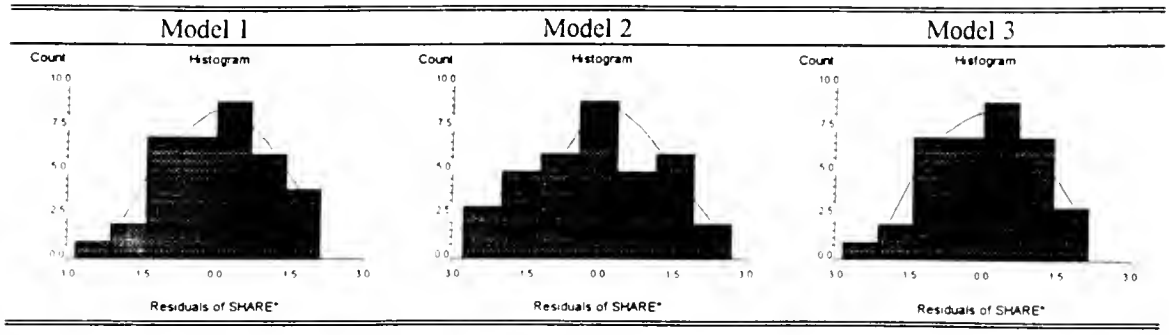
Table 13. Regression models in which market share, SHARE*, is predicted by order of market entry and elapsed time since first entry, ENTRY and ELAPSED, singly and jointly.

Model	Intercepts	ENTRY	ELAPSED	R2 (%)	df Error
1	-1.79***	-0.24***		61.59	34
2	-1.82***		-0.015***	47.47	34
3	-1.83	-0.25***	-0.0018	61.65	33

***p<0.001, **p<0.01, *p<0.05, ~p<0.1

For model 1 (in Table 13), the inspection of scatterplots of raw and studentized residuals did not reveal evidence of heteroscedasticity. Inspection of the normal probability plot and histograms of residual distributions reveal them to be normally distributed. Similar results were obtained for models 2 and 3, as illustrated in Figure 14. Comparison of the residuals of models 1 and 2 suggests that model 1 slightly overestimates share for intermediate values of entry. The introduction of both ENTRY and ELAPSED as predictors seems to correct this discrepancy. However, as shown in Table 13, the introduction of both predictors renders ELAPSED non-significant. This is caused by the already noted multicollinearity. A tolerance statistic (Tol = 0.20) and a Variance Inflation statistic (VIF) of 4.89 do indicate values approaching the usually accepted cut point of 5, thus indicating multicollinearity problems (particularly in a dataset of this size).

Figure 14. Histograms of residuals for three fitted models



Two additional factors were considered in deciding upon the adoption of a sensible baseline model. First, and somewhat ancillary, we have units that have different dimensions and must be interpreted differently. Entry has a maximum value of 21 while ELAPSED has a maximum value of 246 (months). This results in very small Beta coefficients for ELAPSED when used as predictor of SHARE, thus rendering interpretation a bit more difficult. Second and more important, a difference in R-squared tests performed for models 1 and 2 with respect to model 3 shows that both models undergo a significant increment in the value of the R-squared statistic. Comparing the full with the reduced model number 1 ($F_{observed} = 5.16 > F_{critical} = 3.29$), and comparing the full with the reduced model number 2 ($F_{observed} = 12.20 > F_{critical} = 3.29$); we notice in both cases, but particularly in the second case, the real and important change in the magnitude of the R-squared statistic. However, the observed multicollinearity problems, and the potential interpretation difficulties urged us not to choose our baseline model as the most sensible one, but rather analyze models 1 and 2 separately.

After reaching a decision about the choice of question predictors, a taxonomy of multiple regression models was fitted. This taxonomy included the "networking effect"

control variables and the dummy variable REGUL, entered sequentially. Table 14 summarizes the results of these analyses.

An examination of this table shows that the control predictors do not exert any important influence upon the dependent variable SHARE*, either singly or jointly. Further inclusion of these variables into the model does not change the intercept and the coefficient of ENTRY. ENTRY remains negative throughout with a value close to -0.25 ($p<0.001$ in most cases). We observe that interactions of SIZE with the variables INNOV and ENTRY have no significant effect either. The interaction of SIZE and REGUL seems to have an important effect upon the outcome variable (Beta coefficient =0.49, $p<0.05$) which permits to reject the null hypothesis that the slope is zero in the population). Likewise, the interaction between ENTRY and REGUL does seem to exert an important influence upon the outcome variable. When this variable is introduced into the baseline model, both the intercept and the slope of ENTRY remain stable, but its own beta coefficient acquires a value of -0.24 with $p<0.05$ (which permits rejecting the null hypothesis that this slope is zero in the population). In both cases differences in R-squared tests support the inclusion of these variables into the baseline model (for model 10, Fobserved = 515.2 > Fcritical=3.29 and for model 12, Fobserved=520.5 > Fcritical=3.29). These interactions seem to make sense. It is perfectly plausible that regulation, size, and entry do not, through their additive terms, completely specify their effects upon the dependent variable SHARE* because synergies or other effects may be present. These interactions taken together would take the place of a good approximation of the combined effect of regulation, firm size and entry upon the dependent variable.

Table 14 A taxonomy of fitted multiple regression models in which market share is predicted by selected control variables, interactions between them and the question predictor ENTRY.

		Question Predictor	Control Predictors			Interactions						
M	Intercept	ENTRY	SIZE*	INNOV	REGUL	SIZE_ENTRY	SIZE_INN	SIZE_REG	INN_REG	ENTRY_REG	R-sq (%)	dfE
4	-1 59***	-0 20***	0 25								64 8	33
5	-2 81**	-0 22***		0 19							64 3	29
6	-1.51***	-0 25***			-0 69						63 7	33
7	-1 7***	-0 23***	0.036	0 22	-0 87						67 87	27
8	-1 94***	-0 18*				0 013					62 04	33
9	-1 70**	-0 24***					0 0085				61 95	29
10	-1 50***	-0 25***						0 49*			67 41	33
11	-1 58***	-0 25***							-0 07		62 59	29
12	-1 45***	-0 25***								-0 24*	67 47	33
13	-1 57***	-0 24***						-0 31	0 21	-0 58	71 25	27
14	-1 47***	-0 25***						-0 15		0 20	67 52	32

***p<0 001, **p<0 01,*p<0 05, ~p<0 1

However, when both variables are included jointly they change signs and lose statistical significance. The Beta of SIZE_REG goes from 0.49 to -0.15 and the Beta of ENTRY_REG fluctuates from -0.24 to 0.2. This denotes that both variables are correlated (but "pointing" in different directions). In order not to lose valuable information, a composite was created to agglomerate the interaction using Principal Components Analysis. The composite thus created has been termed PC1 to denote the combined interactive effect of these three variables. To create the composite we first standardized variables SIZE_REG and ENTRY_REG. These two units of variances became subsumed into the single composite that ended up containing 98.7% of the total variance. We then calculated scores for the composite and used the scores to construct the variable at issue. Based on this, we fitted a final model adding the composite to the baseline model already chosen. The model is summarized in Table 15.

Table 15 Final fitted regression model in which the dependent variable SHARE* is predicted by ENTRY and a composite that captures the interactions of ENTRY, SIZE, and REGUL.

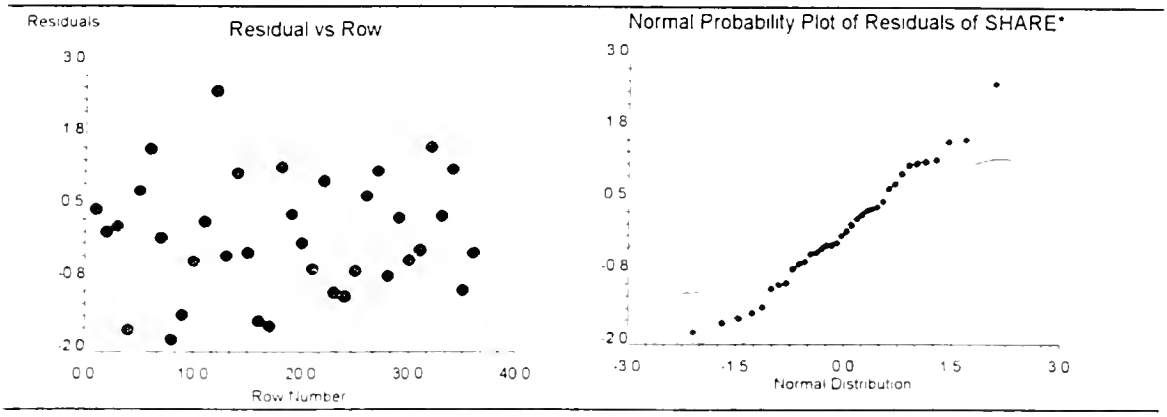
Model	Intercept	ENTRY	PC1	R-sq (%)	dfE
Final	-1.65***	-0.25***	0.44*	67.52	33

***p<0.001 *p<0.05

A difference in R-squared test for this model again shows that there is a real and important change in the magnitude of the R-sq. statistic (Fobserved is, in this case, equal to 524.9 which is greater than the critical F value of 3.29). The model is parsimonious and appears to capture many of the variables of interest. An inspection of the scatterplot of studentized residuals for this model permits validating the assumptions about

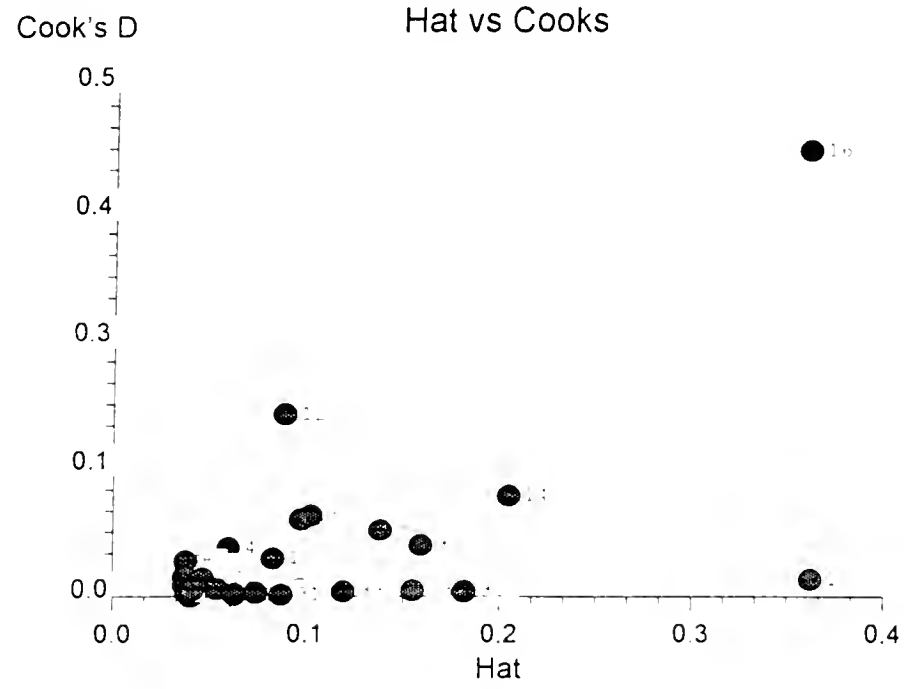
independence of errors (see Figure 15). The assumption about normality of the residuals was validated through inspection of the normal probability plot (Figure 15). Furthermore, no evidence of multicollinearity was found when the model was tested through the tolerance statistic (Tol=0.95).

Figure 15. Plot of residuals and normal probability plot for final model.



Influence statistics were then estimated Cook's D and Hat H were used to assess the impact of atypical data points A scatterplot of these two statistics (Figure 16) shows the existence of two highly atypical data points (cases 15 and 16) A scatterplot of the two statistics shows that these points may have a very important impact upon the model. Therefore sensitivity analyses were carried out.

Figure 16. Plot of influence statistics, Hat H vs. Cook's D.



The analysis revealed the presence of one single data point (case 16) which was having a considerable impact on the fit. A sensitivity analysis performed to investigate the impact of this observation on the fit showed that its removal caused the R-squared value of the chosen model to climb from 67.52% to 68.46%. Case 15 was also identified to have an unusual impact on the model. These cases show unusually low values of the dependent variable SHARE for their relative sizes, thus causing them to show unusually high values on the created composite PC1, as shown on Table 16

Table 16: Impact of atypical data points on fitted model

Cases removed	Intercept	ENTRY	PC1	R-sq (%)	dfE
-15	-1.65***	-0.25***	0.41~	67.25	32
-16	-1.64***	-0.25***	-0.21	68.46	32
-(15 and 16)	-1.60***	-0.24***	0.006	69.67	31

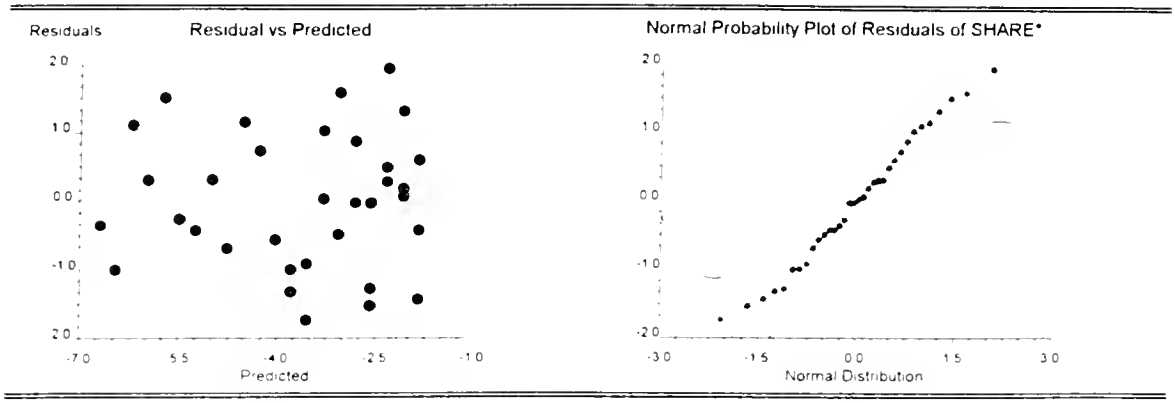
***p<0.001 ~p<0.1

Given these peculiarities and the results of the influence statistics, it appears that the two cases identified as atypical are very different from those of the rest of the sample (and in themselves worth studying), or that data available for those two cases are not accurate. Aside from the increase in the percentage of variability explained, and perhaps more interestingly, the sensitivity analysis also showed substantial changes in some of the β coefficients of the regression model. In particular, the β for PC1 goes from a significant 0.41 to zero! This poses of course a somewhat alarming note: that the presence of these two atypical points may have influenced the process of fitting the taxonomy of regression models. Hence, we went through the exercise of refitting a taxonomy of regression models for the reduced sample. No significant differences were found, except, of course, that the agglomeration of the interactions into one composite turned out to be unnecessary. It becomes evident that the real impact of our question predictor is unduly dampened by these two observations. Having done that and having refitted a taxonomy of regression models we were left with an unexpected result: Our best and chosen model is one that simply regresses SHARE* against ENTRY!

We chose that model as our final model. The assumption about normality of the residuals was validated through inspection of the normal probability plot and the

histogram of the residuals. Inspection of plots of raw and studentized residuals permitted validation of the assumptions about independence of errors as shown in Figure 17.

Figure 17. Plots of residuals and normal probability plot for final regression model.



The final model obtained is shown in Table 17[6]

Table 17 Fitted final model: Dependent variable SHARE*

Intercept	ENTRY	R-sq (%)	dfE
-1.60***	-0.24***	69.67	32

***p<0.001

We then proceeded, in a similar fashion, to fit a model in which SIZE*, INNOV, and REGUL were included as control predictors and ELAPSED as a question predictor, controlling also for interactions among these variables. The second final and most

[6] Including(with pair-wise deletion) the alternative measure for INNOV, which used the difference in chi square caused by the introduction of the new product into the bank's client-product matrix, did not cause any appreciable change to this final result.

parsimonious fitted model regresses SHARE* on ELAPSED (intercept = -1.82, $p<0.001$; coefficient of ELAPSED = -0.00154, $p<0.001$).

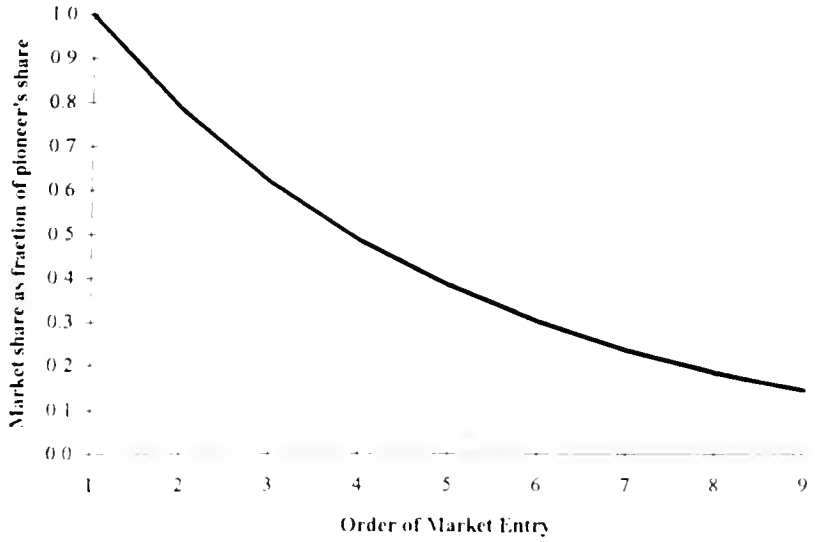
Summary and Conclusion

We wanted to assess the effect of order of market entry upon market share, controlling for some "networking effects" The goal was to determine whether innovation initiatives in the development of new financial services may render better performance if launched during certain time frames.

We found that a baseline model in which SHARE* was regressed against order of market entry (ENTRY) explained almost 70% of the variability in performance. Including control variables such as the firm's size and the amplitude of its product offerings did not have a sizable effect upon our baseline model. Our analysis turned out to be in line with most of the prior research work that has been performed in other industries, particularly consumer products.

Our analysis shows that financial industry practitioners may benefit from correctly timing the release of their new products. Figure 18 is a visual display of our model results for different orders of market entry. The visual display has been "untransformed" and results have been computed as a percentage of the pioneer's share to facilitate interpretation.

Figure 18. Results of final model of order of market entry versus market share for a prototypical case.



Our findings indicate a negative relationship between order of market entry and long term market share. A second entrant is likely to capture approximately 78% of the pioneer's eventual market share. A tenth entrant will only capture 11% on average. The results appear to be in line with those performed in other industries. Table 18 establishes such a comparison. It appears that our model slopes downward more rapidly and later entrants are penalized more heavily

Table 18: Order of market entry and market share for consumer packaged goods, prescription anti-ulcer drugs, and financial services innovations.

	Forecasted Market Share Relative to the Pioneering Brand			
	Consumer Packaged Goods		Prescription Anti-Ulcer Drugs	**Financial Products**
Entry order	Urban et al. (1986)	Kalyanaram and Urban (1992)	Berndt et al. (1994)	**This study**
First	1.00	1.00	1.00	**1**
Second	0.71	0.76	0.70	**0.79**
Third	0.58	0.64	0.57	**0.62**
Fourth	0.51	0.57	0.49	**0.49**
Fifth	0.45	0.53	0.44	**0.38**
Sixth	0.41	0.49	0.40	**0.30**

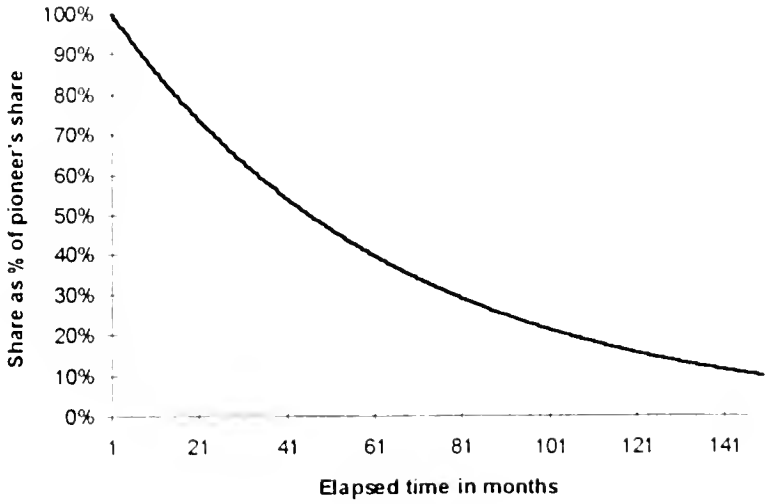
Modified from Kalyanaram et al (1995)

Using order of market entry alone, however, might render somewhat equivocal results because simultaneous entries or entries separated by large periods of time cannot be distinguished Results need to be moderated by a sense of real time between entries and, for such purpose, interpreting entry utilizing real elapsed time is very illustrative. As we can see in Figure 19, if subsequent entrants invade the market within short periods of time after the pioneer, pioneering advantages are scant. Shorter lead times means pioneers have less time to establish their brand names. Early competitive rivalry favors later entrants' market shares. From the pioneer's perspective lengthening lead time by one year could represent, according to our data, as much as 2.5% of overall market share.

We can also observe that the use of order of market entry alone tends to average out elapsed time between entries. With our data such average comes out to approximately 15 months between entries. This means that the results for the second, third, fourth, and so forth entrants are roughly equivalent to entries occurring after 15, 30, and 45 months respectively in the second model.

Use of elapsed time since first entry also adds to a managerial interpretation of these models. We see that, for our sample of products, entrants which follow shortly after the pioneer may obtain substantial market shares relative to the pioneering brand; a result which is not obvious by looking at order of market entry alone.

Figure 19 Results of final model of elapsed time since first entry versus market share for a prototypical case



In summary, several important results emerge from this research.

First, there are important advantages to early entry in financial services innovations. This result extends established generalizations to other industries and settings in a field that " relies heavily on North American manufactured goods that are included in either the Urban et al. Assessor data or the PIMS data" (Kalyanaram et al., 1995: 9).

Second, several outcomes of this research contribute more generally to the literature on order of market entry On the one hand we observe that level of analysis matters. If we look at individual products, establish their longitudinal histories, and operationalize pioneering as the first entrant, we find that the pioneers do not necessarily retain an appreciable market share advantage. This is true in two of the three product lines explored. This is consistent with the exposition of Golder and Tellis (1993) although in our case the product histories are more concise because of the youth of the product lines studied. On the other hand, when our product sample is aggregated, an important early entry effect is observed. We get results which are in line with much other literature on pioneering advantages. Evidently by aggregating the data we can only assert to the advantages of early entry and not those of pioneering strictu sensu. History reveals a more detailed picture that cannot be completely captured in cross sectional studies.

Third, it appears to be useful and important to reframe the original research question here posited and to consider elapsed time since first entry when evaluating these models. These effects have been, to the best of our knowledge, explored only in two

studies. The study of Huff and Robinson (1994) determined that increasing the years of competitive rivalry (i.e., reducing the pioneer's lead time) tended to reduce the pioneer's market share advantage. Hurwitz and Caves (1988) examined 56 pharmaceutical products and their performance after patent expiration. They report that longer patent life (i.e. longer pioneer lead time) renders appreciable market share advantages. Evaluating order of entry in terms of elapsed time since first entry also ties to the industrial organization literature, particularly the work of Sutton (1995). Sutton posits that the presence of first-mover advantages may have important effects upon industry structure. Given enough lead time, a first-mover may spend more on advertising, thus preempting or relegating subsequent entrants to weak positions. Sutton's (1995) empirical examples do indicate that such preeminence might be tightly linked to the time elapsed between first and subsequent entries. Because first mover advantages affect market structure, one could plausibly argue for a negative relationship between elapsed time and market concentration. Such elapsed time might obey to historical occurrences (history matters, as Sutton (1995) indicates). Moreover, it is interesting to speculate that in the absence of all sorts of exogenous influences, historical or otherwise, the phenomenon of innovation could render sequential entries with characteristic periods per industry. Variance in such "characteristic frequencies" could point to more or less difficulties in imitating products, establishing the necessary network externalities for products to diffuse rapidly and dominate the market, or both; thus establishing a firmer tie with the literature about product and process innovations and dominant designs. Moreover, it appears that such frequencies should be

related to characteristic life cycles of revenues whereupon entry at any point in time should be evaluated in terms of its concomitance with the characteristics of such cycles.

Likewise, the idea of using the variation exerted by the new product (or brand) into the firms current product offerings (using our client-product matrix methodology or similar ones) clearly deserves further evaluation over longer periods of time and with larger samples of detailed data. Although in our case we did not find any significant effect, it seems compelling to use such measures to proxy deviations in current strategy. If in fact a firm is venturing to pioneering a product that appears too far away from its core, pioneering may not be advantageous In the case of banks, particularly where alternative measures of hedging are not available, such occurrences could point to changes in the institution's risk profile These ideas are left here as suggestions for further research

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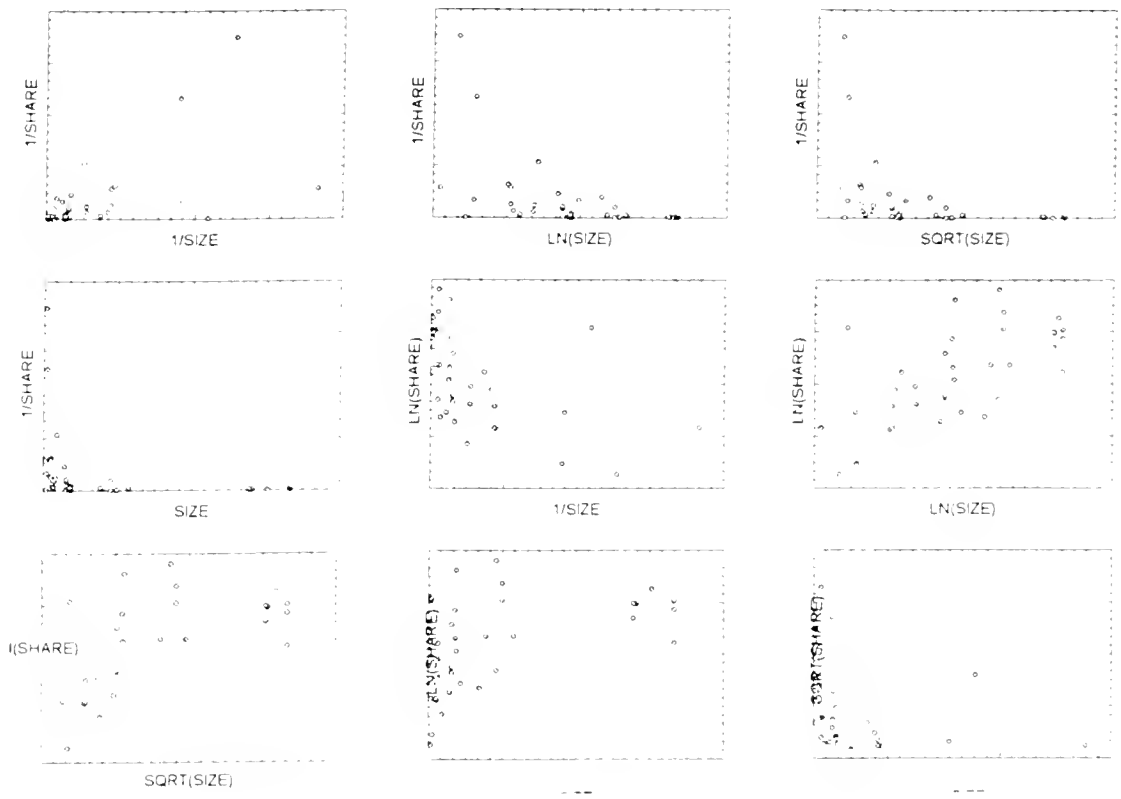
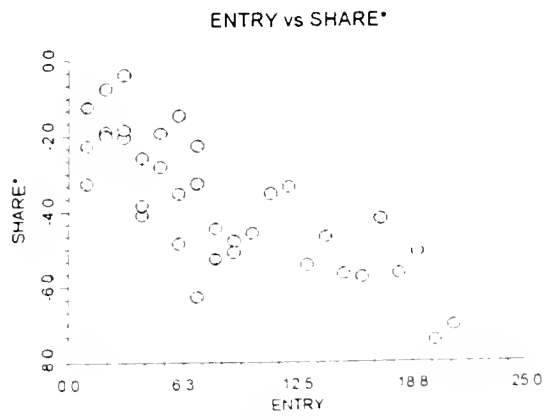
Appendix 1

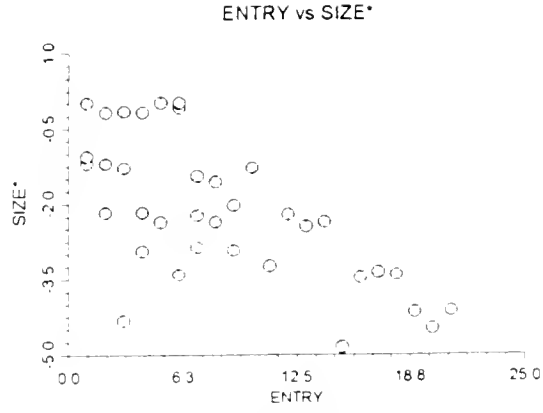
Scatter-plot matrix report for various transformations of SHARE and SIZE

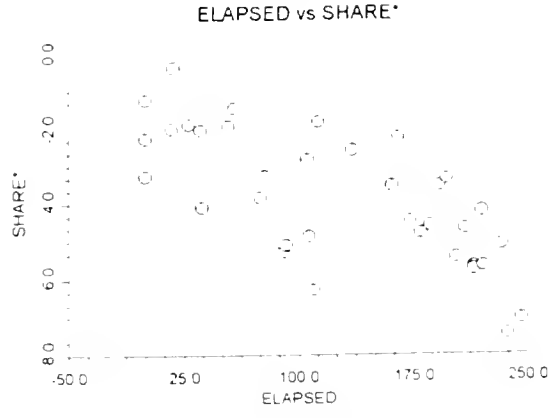


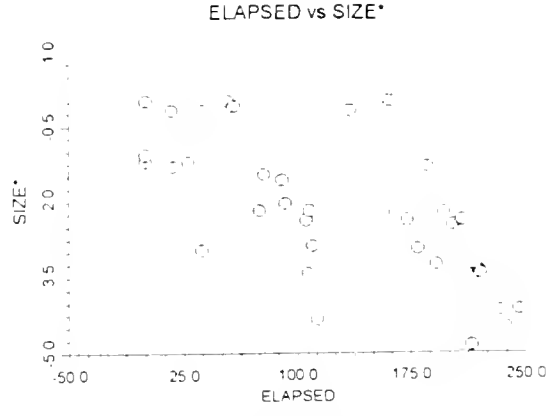
Appendix 2

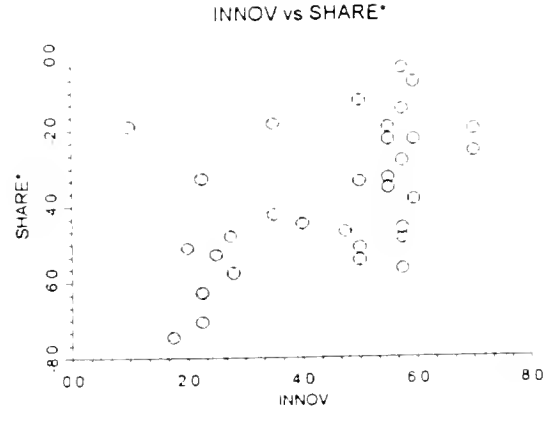
Selected scatterplots after transformations.

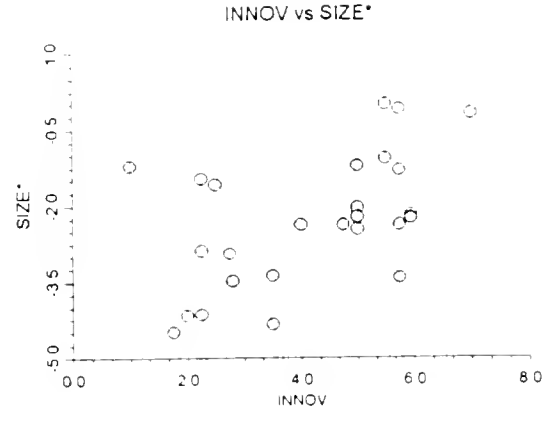












Appendix 3.

Table Ap3-1: Difference between Pearson and Spearman correlations (pair-wise deletion)

	Variables				
	ENTRY	ELAPSED	INNOV	REGUL	SHARE*
ENTRY	0.000				
ELAPSED	-0.021	0.000			
INNOV	0 007	0 027	0.000		
REGUL	0.010	-0.003	-0.054	0.000	
SHARE*	0.018	0.012	0.023	0.025	0.000
SIZE*	-0 008	0 066	0.078	0.009	-0.017

Appendix 4

Measure of Strategic Focus

To obtain a measure of strategic focus, we used the chi-square distribution of each bank's client product matrix. Though normally used to test hypothesized relationships among categories of data points, we used chi-square in this case as a measure to establish degree of strategic focusing. We first classified institutions' clients and products and developed "client-product" matrices. Therupon, two measures were developed

A)

In the first measure, a comparison was made between the chi-square obtained for particular client-product matrices with respect to a client-product matrix of a totally unfocused institution (for practical purposes one with a large number of products in each cell of the client-product matrix). The procedure used was as follows:

Let

Ncp = number observed in (c,p)th cell of the client product matrix, and

ecp= number expected in the (c,p)th cell under the assumption of a totally unfocused institution with a large and equal number of products in each cell

for c= 1,2,3, and p= 1,2,3.

$$\text{Let } N_p = \sum_{p=1}^{3} N_{cp} \text{ ,and}$$

$$N_c = \sum_{c=1}^{3} N_{cp}$$

Then we calculated a chi square as follows: